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STATEWIDE COVERAGE OF VERY LOW BIRTHWEIGHT INFANTS AND TEENAGE MOTHERS (LESS THAN 15 YEARS OF AGE) IN NORTH CAROLINA'S CHILD SERVICE COORDINATION PROGRAM: 1991 AND 1993

by

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ABSTRACT

This study compares the 1991 and 1993 coverage or enrollment rates for very low birth weight (VLBW) infants and teenage mothers (less than 15 yrs.) in North Carolina's Child Service Coordination (CSC) Program, for the state as a whole and for each of the state's six perinatal care regions. The study population included NC state resident births for 1991 and 1993 who were referred to the CSC Program. For both study years, VLBW infants and mothers under 15 years enrolled in CSC, were matched to the live birth files.

The number of matched participants was expressed as a percent of the total number with the corresponding risk condition in the birth population. Coverage was also classified by whether a mother received prenatal care in a health department. It was assumed that coverage rates for both risk groups would be higher in 1993 than in 1991, and that coverage would be higher among recipients of care from local health departments.

Among VLBW infants who survived the first year of life, 79.1 percent were enrolled in the CSC Program in 1991; and in 1993, the VLBW enrollment rate dropped to 74.1 percent. For mothers under 15 years, the 1991 total coverage rate was 64.3 percent in 1991 and 70.4 percent in 1993. Statewide, health department coverage of VLBW infants and teen mothers was higher than that of private providers or those who had no prenatal care for both study years. Regional differences indicated that program coverage was generally higher for VLBW infants and mothers under 15 who received prenatal care from health departments, but not in all instances.

Coverage rates were significantly higher among health department patients for both risk groups in both study years. The overall decrease in the 1993 CSC coverage of VLBW infants was due to a significant reduction in the percentage of VLBW infants enrolled from non-health departments compared to the corresponding percentage enrolled in 1991. The overall increase in the 1993 CSC coverage of mothers under 15 was due to a significantly higher proportion enrolled from non-health departments, compared to the corresponding rate for 1991.

These findings, particularly at the regional level, provide a preliminary measure for evaluating the identification and referral process of the CSC Program.

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INTRODUCTION

The Individuals with Disabilities Education Act[1] requires states to develop and maintain an early identification and service coordination system for young children with known developmental delays or disabilities. North Carolina met and exceeded this requirement by establishing the Child Service Coordination (CSC) Program in October, 1990. The CSC Program serves not only infants and toddlers with established conditions but also those considered to be at high risk for delay.

Currently, less than 12 states participate in the federal option to serve at-risk infants[1]. This latter group of infants in North Carolina is identified from one or more behavioral and/or biological risk conditions, comprised of 13 indicators of parent/family risk and 10 indicators of neonatal risk.

In this report, we determine the extent of CSC coverage for two of these risk groups: (1) mothers less than 15 years of age, (parent/family risk); and (2) infants weighing less than 1500 grams (under 3 lbs. 5 oz.) at birth (neonatal risk).

In an era of decreasing funds and demands for program accountability, program evaluation has become increasingly urgent. Using existing data is a practical way to evaluate program coverage and target areas that warrant follow-up or closer examination. By linking program files with population-based files, it is possible to identify all people within the program's service area as well as their status regarding enrollment[2]. In this study, coverage was defined as the proportion of very low birthweight (VLBW) infants and mothers under 15 years of age identified from birth certificates who were also enrolled in the Child Service Coordination Program.

The purpose of this study was to compare the 1991 and 1993 CSC enrollment rates of VLBW infants and teen mothers (under 15 yrs.) in the CSC Program, for the state as a whole and for each of the state's six perinatal care regions.

It was assumed that coverage rates for both risk groups would be higher in 1993 than in 1991, and that there would be higher rates of coverage among mothers receiving prenatal care in health departments, compared to those receiving prenatal care in non-health department settings. The latter assumption was based upon the fact that the majority of CSC service providers are located in health departments and often work with maternity care coordinators (also positioned in health departments), who are the first to contact high risk pregnant women and refer them directly to CSC for postpartum services. It was also assumed that North Carolina's Child Service Coordination Program would increase its enrollment rate over time.

METHODS

Risk Conditions. Birth certificates for children born in North Carolina were examined for maternal age less than 15 and birthweight less than 1500 grams. Each category was treated independently so that a mother could either be less than 15 years of age, or could have delivered a very low birthweight infant, but not both. Mothers with both risk factors were not included in the study. All infant deaths associated with VLBW births for 1991 and 1993 were also excluded from the analysis.

File linkage. Coverage was assessed by linking two data files. The first file contained data from the CSC Identification and Referral (I & R) forms for children born in 1991 and 1993, and referred to the program prior to July, 1992 for the 1991 population and prior to July, 1994 for the 1993 population. This file contained date and hospital of birth, the child's name, and date referred to the program.

The second data file, obtained from birth certificates, included information about birthweight, maternal age and county of residence, and the child's name, date of birth, and hospital of birth. Information regarding the mother's use of the health department for prenatal care was added to these birth files.

Matching procedures. The CSC I & R form was merged with the 1991 and 1993 birth records (with infant deaths deleted) by matching on either of two identifiers. The first identifier used the first three letters of the child's last name, the first seven letters of the first name, and date of birth. A second identifier was also constructed from the first three letters of the last name, the first letter of the first name, date of birth, and hospital of birth. This second identifier was designed to find additional birth certificate matches.

Data Analysis. The data were categorized by perinatal care region. North Carolina's 100 counties are divided into six perinatal care regions: Western, Northwestern, Southwestern, Northeastern, Southeastern, and Eastern (see Appendix). In each region there is at least one (Level III) hospital that provides neonatal intensive care for high risk infants. In order to achieve sufficient sample size for a small area study, the data were grouped from the county-level up to the perinatal care regional level.

Comparisons between the 1991 and 1993 CSC coverage rates for VLBW births and mothers under 15 years of age were broken out by health department (HD) and non-health department status (non-HD), regarding the mother's use of prenatal care. Health department coverage was determined from the Health Services Information Systems (HSIS) files, which identify mothers receiving prenatal care through health department providers. Approximately one-fourth of all pregnant women in North Carolina receive their prenatal care in public health departments.

Coverage was based on matched cases, that is the number of infants/families enrolled in CSC (because of VLBW or teenage motherhood) who were matched to the birth files. Coverage was calculated as:

$$\text{coverage} = \frac{\text{number of matched CSC enrollees with risk condition}}{\text{total number with corresponding risk in the birth population}}$$

and expressed as a percent for statewide and regional populations.

When describing differences between coverage rates, we expressed the difference in percentage points, resulting from the subtraction of two percentages. The Chi-square test was also used to test for differences in the percentage of infants enrolled in CSC when prenatal care was provided in health departments and in private facilities; statewide differences comparing the 1991 and 1993 rates of coverage for both risk groups were also tested.

RESULTS

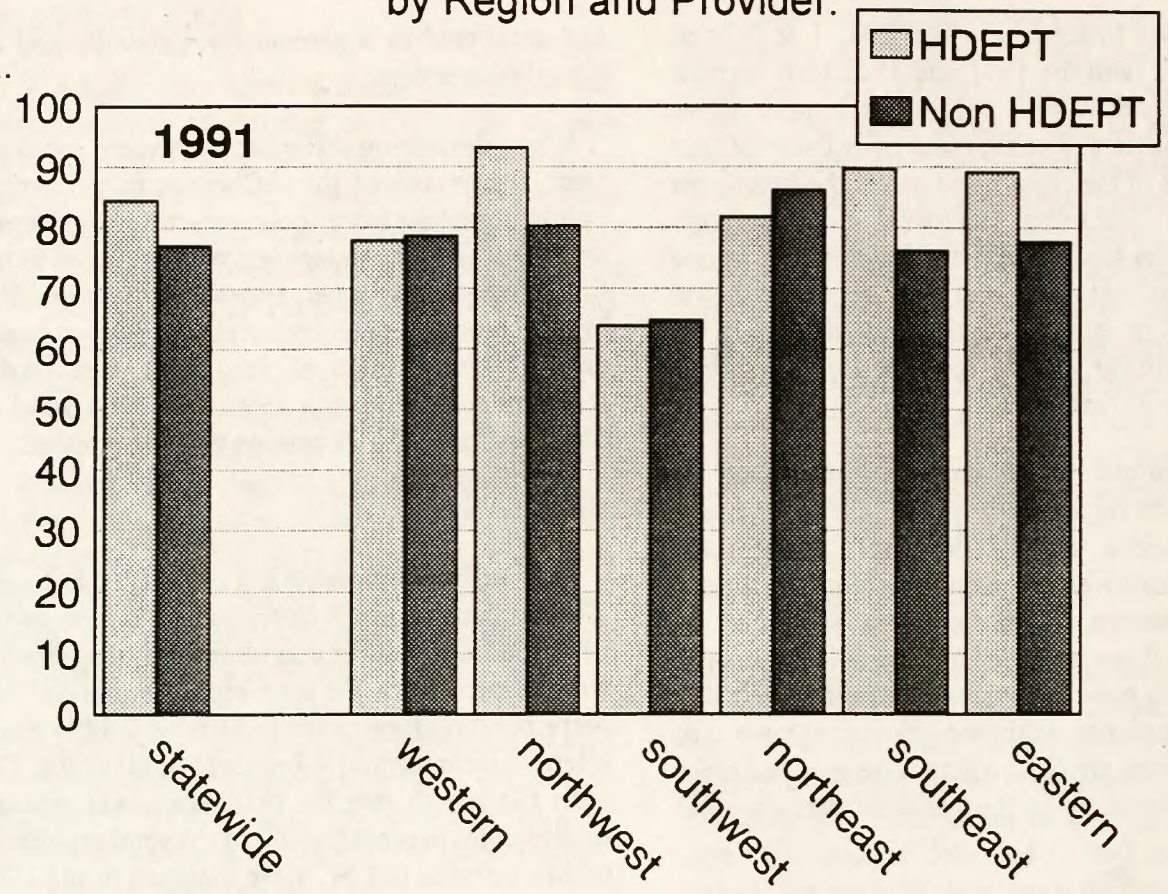
CSC infant birth match. For 1991, there were 7,491 infants referred (for all risk factors) to the Child Service Coordination Program; that number was 7.3 percent of the state birth population. The corresponding figures for 1993 were 9,889 infants referred, representing 9.7 percent of all births. The birth file match rate for both years was similar. Eighty-eight percent (6,607) of the total number of infants referred to CSC were matched to the 1991 birth file; for 1993, 87.5 percent (8,658 infants) were matched to the 1993 birth file. For VLBW infants who died during the first year of life, 167 were excluded from the analysis of the 1991 population, and 225 were excluded from the analysis of the 1993 population.

CSC Coverage of VLBW infants. Of the 1,222 VLBW infants born in 1991 who survived the first year of life, 79.1 percent were referred to the CSC Program (297 from health departments and 670 from the private sector). Among the 1993 population of 1,326 VLBW infants who survived the first year, 74.1 percent were referred to CSC (298 from health departments and 685 from private settings).

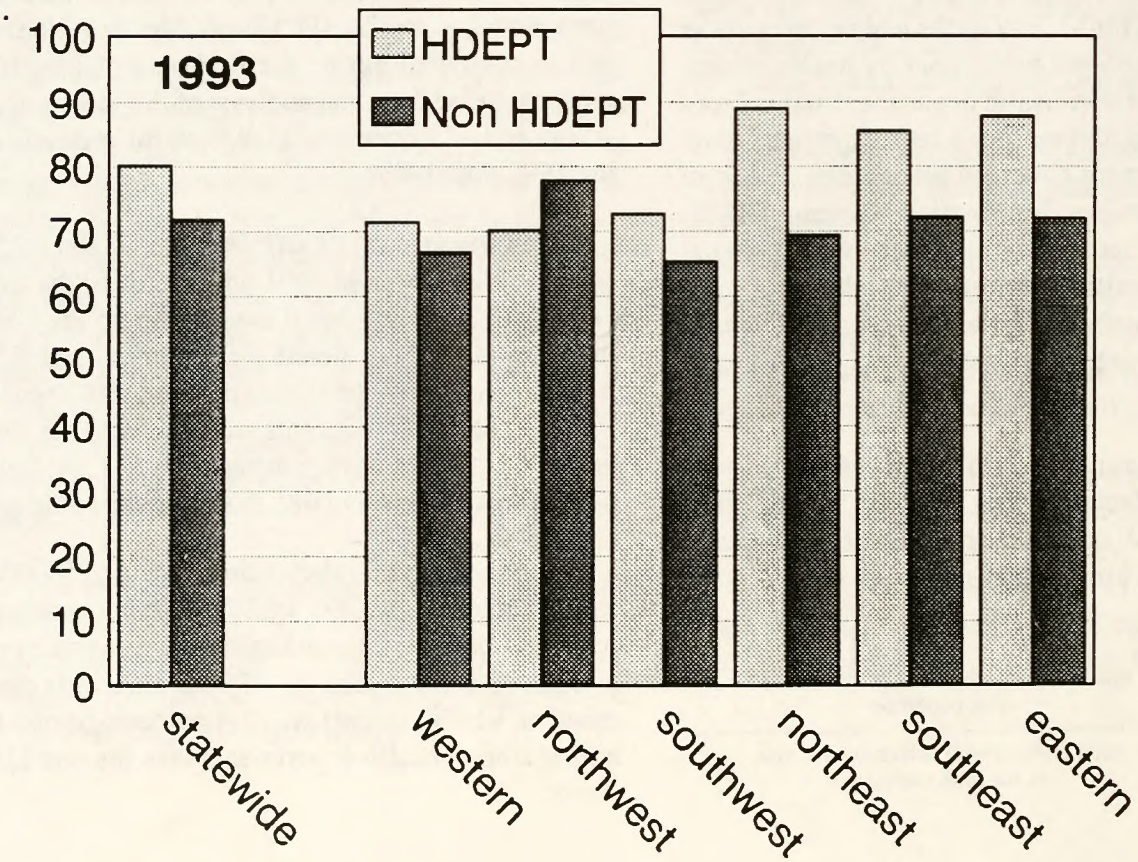
Figure 1a. (page 4) shows the percent of VLBW infants enrolled in CSC in 1991 among mothers receiving prenatal care in health departments or in non-health departments. In 1991, the statewide coverage of VLBW infants was 7.4 percentage points higher among health departments than the non-HD sector.

Figures 1a & 1b. Percent CSC Coverage of VLBW Infants, by Region and Provider:*

1a.



1b.



Note: all infant deaths excluded

Variation in regional coverage indicated that Northwestern, Southeastern, and Eastern regions had significantly higher rates of HD coverage of VLBW infants than the non-HD sector ($p<0.05$; see Appendix, Table 1). There were marginal or small differences, however, between HD and non-HD coverage in the Western and Southwestern regions. In the Northeastern region, non-HD coverage exceeded that of HD providers by 4.4 percentage points.

Figure 1b. shows the 1993 coverage of VLBW infants. Again, as was the trend in 1991, the 1993 statewide coverage rate of these infants was higher in the health department sector than in the non-health department sector. Two of the same regions in 1991 and in 1993 – the Southeastern and Eastern regions – had statistically higher rates of public sector coverage compared to the respective rates in the private sector ($p<0.05$).

The largest difference between provider groups was found in the Northeast, where HD coverage surpassed non-HD coverage by 19 percentage points. However, in contrast with the previous trends, HD coverage in the Northwest fell by 23 percentage points in 1993. This rate (70.1%) was lower than the comparable rate achieved in the non-HD sector (77.8%). Furthermore, a statewide decline in CSC coverage of VLBW infants for both HD and non-HD groups was evident from 1991 to 1993 – 5.2 and 4.3 percentage points for non-HD and HD coverage respectively.

Coverage of Mothers less than 15 years of age. Among mothers less than 15 years of age from both provider groups, 64.3 percent (n=259) were enrolled in CSC in 1991; for 1993, this rate climbed to 70.4 percent (n=307).

Figures 2a. and 2b. (page 6) present the 1991 and 1993 coverage rates by provider status for mothers less than 15 years of age. In 1991, the gap in CSC coverage between provider groups was particularly apparent. A 16.7 percentage point difference in the HD/non-HD coverage rate was observed at the state level. Regionally, the largest gap in coverage occurred in the Northeast region, where HD coverage exceeded non-HD coverage by 30.3 percentage points. The Eastern region had the smallest difference in coverage between providers. In the Western region, where non-HD coverage was higher than HD sector coverage, the percents should be regarded with caution since the number of teens identified in the west was very small (see Appendix, Table 2).

In 1993 (Figure 2b.) CSC coverage of teenage mothers in the non-HD sector went up in 4 out of 6 regions. Approximately 66 percent of young teens in non-health department settings were identified statewide in 1993, compared to 54 percent from the same sector in 1991. At the regional level, coverage rose by 9 percentage points in the Northwest, by 13.6 points in the Southwest, by 25 points in the Northeast, and by 14.7 points in the East. It was only in the Southeast that non-HD coverage fell in 1993, by a small amount.

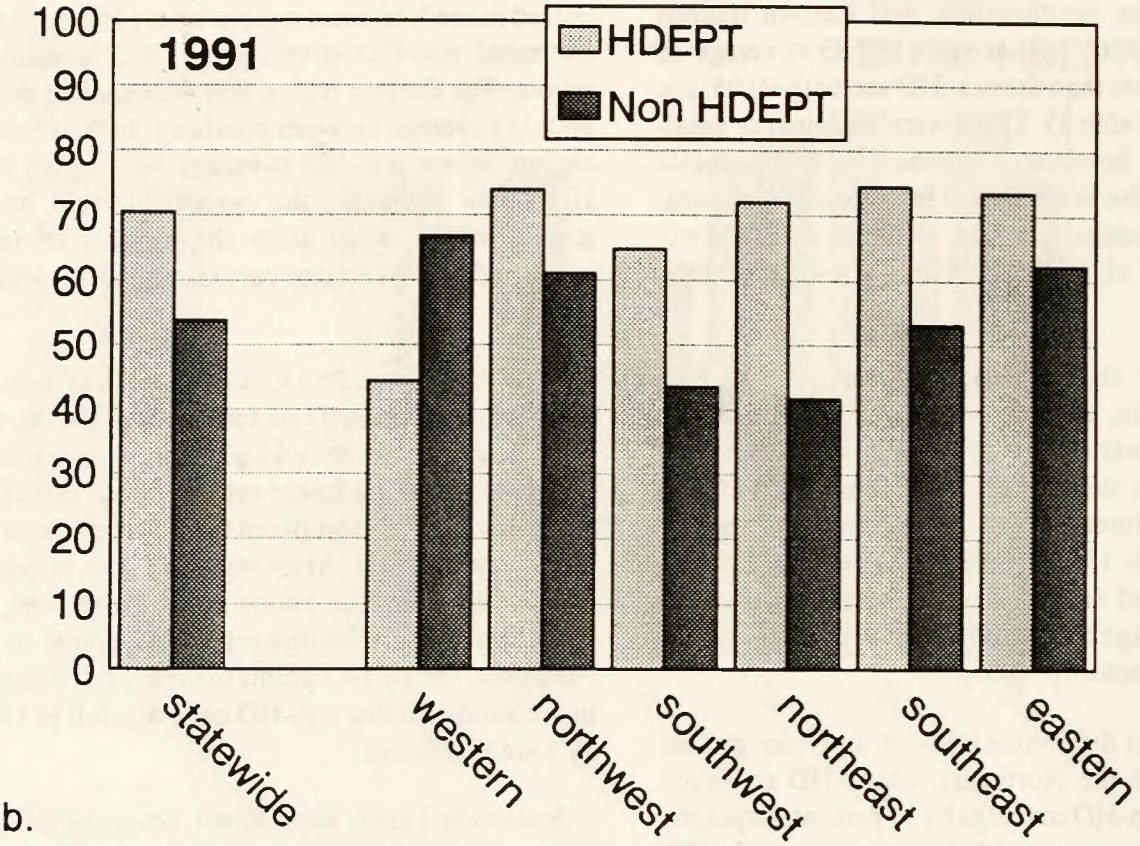
Statewide health department coverage of teen mothers in 1993 rose only slightly, from 70.4 percent in 1991 to 73.9 percent in 1993. Increases in regional coverage for 1993 were observed in the East, Northeast, and Southwest ranging from 14.5 to 5.6 percentage points. For the most part, however, these regional increases were not as large as those demonstrated in the non-HD sector. And, among regions where there was no increase of HD coverage for teen mothers in 1993, the Northwest rate fell by 15.3 percentage points from its earlier 1991 rate.

COMMENT

The results of this study provide limited support for the assumption that statewide coverage would be higher for both risk groups in 1993 than in 1991. This proved to be true only for mothers less than 15 years of age. Statewide CSC coverage of young teen mothers, from both sectors combined, increased by 6.1 percentage points from 1991 to 1993 ($p<0.05$), while total coverage of VLBW infants decreased by

Figures 2a & 2b. Percent CSC Coverage of Mothers <15 yrs, by Region and Provider: *

2a.



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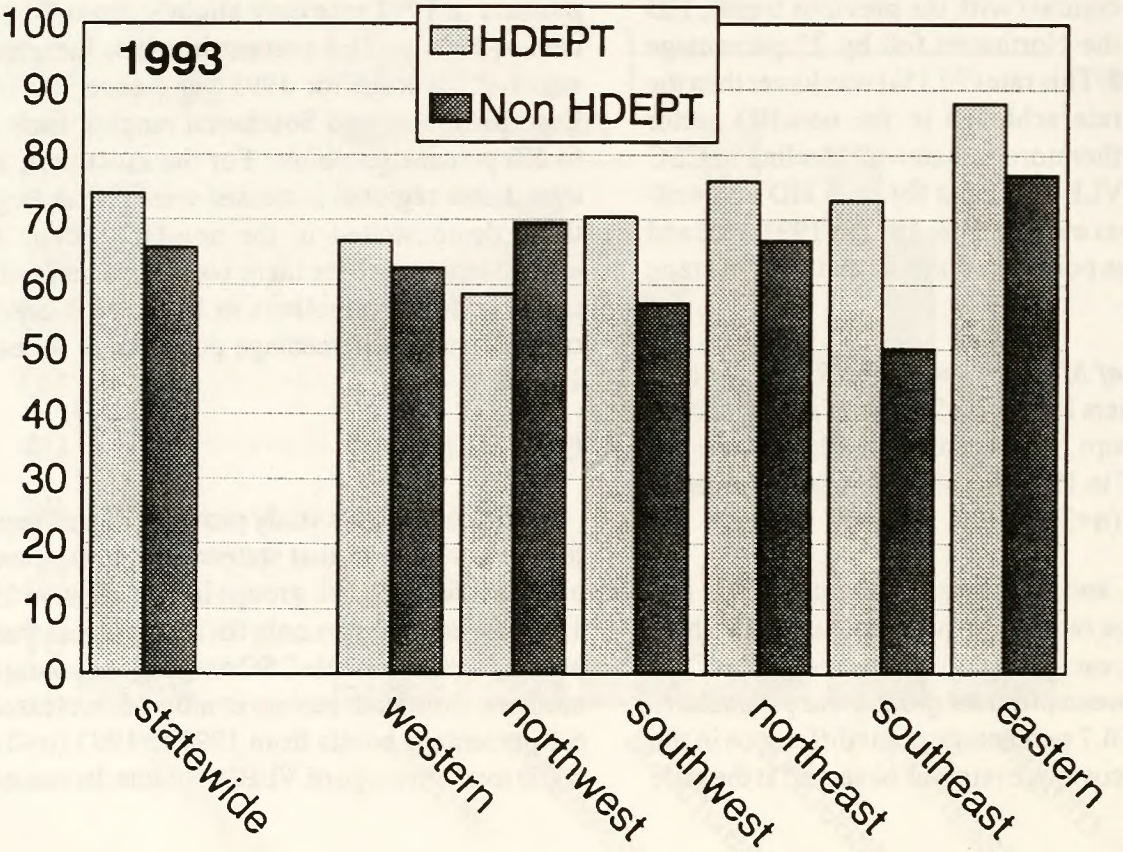

Note: mothers under 15 with VLBW infant excluded

5 percentage points over the same period ($p<0.01$). With regard to the assumption that coverage rates would be higher among the public health sector, the results indicated that statewide coverage for both risk groups and in both study years was consistently higher in the HD sector than in the non-HD sector (see Appendix, Tables 1 & 2).

An understanding of how coverage changed among health care providers may help explain the 1993 outcomes associated with total coverage. The overall increase in coverage (6 percentage points) among teens was due, in part, to a significantly higher percentage of these young mothers identified in the non-HD sector in 1993 compared to those enrolled from the same sector in 1991 (Chi-square 5.3, $p<0.05$).

Conversely, the decline in the statewide 1993 VLBW coverage rate was associated with a statistically significant reduction in the percentage of these infants enrolled from non-health department settings in 1993, compared to the corresponding percentage in 1991 (Chi-square 6.5, $p<0.05$).

Lower coverage rates for VLBW infants identified in non-health departments, compared to those identified in health departments, may be associated with the fact that the majority of these infants (approximately 70 percent) are born to mothers receiving prenatal care in private clinics/hospitals, which may not be as aware of maternity care coordination or CSC services. Presumably, VLBW infants from the private sector would have less occasion to be "known to the system," and therefore less opportunity to be referred to CSC.

However, the fact that more than 70 percent of these private sector VLBW infants were enrolled in the CSC Program for both study years, speaks well of the outreach efforts that have been established in the private sector since the early stages of the CSC Program.

(Apart from what is discussed above regarding public/private sector coverage of VLBW infants, it should be noted that some VLBW infants do well in neonatal intensive care units and might not be referred to the CSC Program, based on the doctor's judgement.)

Health department coverage rates were also higher for mothers under 15 years. This may be due to the unique characteristics of this population. For instance, CSC service workers in health departments may have a greater familiarity with the county's rural population and geography than their counterparts in the private sector. This may, in turn, increase postpartum contact with teens who often do not have their own residence.

Moreover, certain historical events associated with the development of the CSC Program are likely to figure prominently in these results. For example, between 1991 and 1993, CSC caseload sizes in some county health departments soared to very high numbers; in some instances, there were 100-200 cases per full time CSC coordinator. It wasn't until July, 1993 that the CSC Contract Addendum, limiting caseload size, became effective. Such heavy caseloads could account for the observed, 1993 statewide decline in CSC coverage of VLBW infants.

Also, in the early stages of the CSC Program, public health nurses predominated in the professional mix of CSC coordinators; whereas by 1993, social workers began to predominate in the roster of CSC coordinators. This change in professional mix of service providers could similarly account for the observed, 1993 increase in CSC coverage of teenage mothers across the state. This assumes that social workers would have a special interest (and training) in family-type problems such as teen pregnancy (personal communication; Linda Dodd, April 1995)[3].

Potential policy or program issues associated with these results exist regionally. Studies such as this provide an opportunity to compare the enrollment performance of the program both within and across different areas of the state, from two perspectives in time.

By assigning baseline coverage to the 1991 rates, it is possible to estimate the relative change in enrollment performance for each region of the state. For example, in 1991 the Northwestern region had the highest coverage of HD sector VLBW infants in the state (93.2%), while in 1993, the northwest had the lowest HD sector coverage of VLBW infants in the state (70.1%). Similarly, regions with little or no change between time periods may also be identified. For example, the Southwestern region ranked lowest in the state in non-HD sector coverage of VLBW infants in 1991 and in 1993.

The ranking of state perinatal care regions by CSC enrollment and by provider status could serve as a preliminary evaluation tool for identifying those areas and service sectors in the state that *may not* be functioning as well as other regions of state.

The limitation of these results need to be considered as well. In any study involving computer-assisted matching of large data files there is always the possibility of bias. In this study, bias is likely to be reflected in an under-count of CSC participants, due to CSC records that did not match the birth files. The true number of CSC participants among NC resident births for the study population is higher than that reported. Different names or birth dates for the same individual, occurring in the birth and I & R files, would result in a non-match using computer-assisted matching. However, the match rates of 88 and 87.5 percent, for 1991 and 1993 respectively, are probably adequate.

Other studies involving large data files have also reported similar matching results. Yip and colleagues (1991) reported an 89 percent match rate[2], using linked birth/WIC records to evaluate statewide coverage and targeting in Tennessee's WIC Program.

It's important to consider that the validity or interpretation of these results at the regional level may not coincide with the experience at the county level. How well these results depict what is "actually going on" will be determined by those with the experience and knowledge of the CSC programs at the regional level.

Most importantly, it should be emphasized that the CSC Program is family-driven, and that it is up to parents to ultimately decide whether to enroll their child in the program.

Acknowledgements

The authors wish to recognize Cheryl Segrist for her early work on this project, particularly for her development of the computer programs used for matching CSC participants to the birth files. The authors also gratefully recognize Linda Dodd, Tom Vitaglione, and Paul Buescher for their helpful comments on some issues raised in early drafts of the manuscript.

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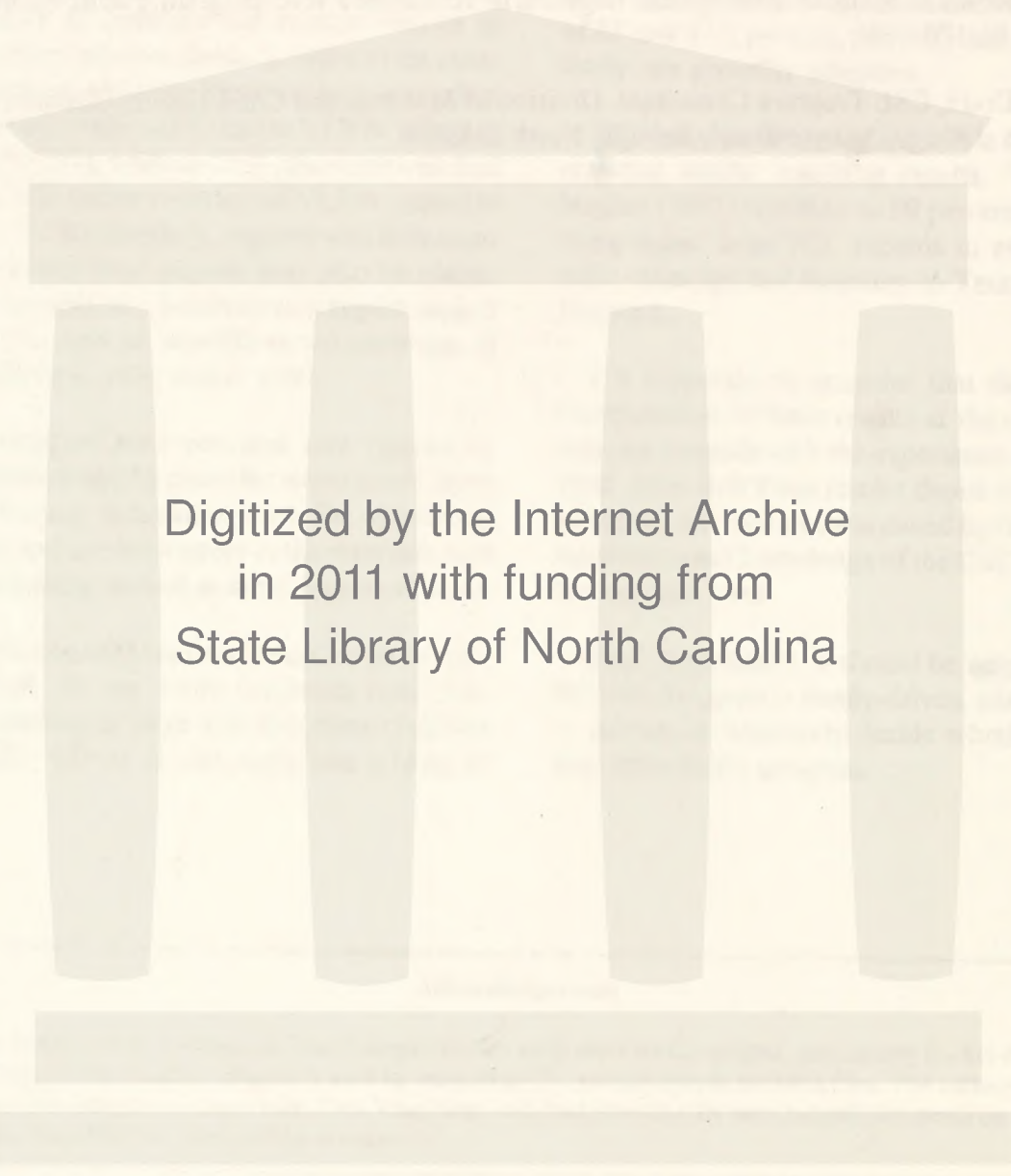
3. Linda Dodd, CSC Program Consultant. Division of Maternal and Child Health, Children and Youth Section. 1300 St. Mary's Street, Raleigh, North Carolina.



APPENDIX

TABLE I

VERY LOW BIRTHWEIGHT
North Carolina At-Risk* Resident Live Births Covered by Child Service Coordination (CSC) by Perinatal Care Region and Provider, 1991 and 1993

	1991		1993	
Region	**HD**	**N-HD**	**HD**	**N-HD**
STATEWIDE	352	870	372	954
Covered by CSCP	297	670	298	685
Percent	84.4	77.0[b]	80.1	71.8[c]
WESTERN	27	28	28	36
Covered by CSCP	21	22	20	24
Percent	77.8	78.6	71.4	66.7
NORTHWESTERN	59	227	67	252
Covered by CSCP	55	182	47	196
Percent	93.2	80.2[b]	70.1	77.8
SOUTHWESTERN	47	170	73	164
Covered by CSCP	30	110	53	107
Percent	63.8	64.7	72.6	65.2
NORTHEASTERN	60	151	54	163
Covered by CSCP	49	130	48	114
Percent	81.7	86.1	88.9	69.9[b]
SOUTHEASTERN	67	147	69	161
Covered by CSCP	60	112	59	116
Percent	89.6	76.2[a]	85.5	72.0[a]
EASTERN	92	147	81	178
Covered by CSCP	82	114	71	128
Percent	89.1	77.6[a]	87.7	71.9[b]

*infant deaths excluded

[a] $p < 0.05$
[b] $p < 0.01$
[c] $p < 0.001$

TABLE II

MATERNAL AGE < 15
North Carolina At-Risk* Resident Live Births Covered by Child Service Coordination (CSC) by Perinatal Care Region and Provider, 1991 and 1993

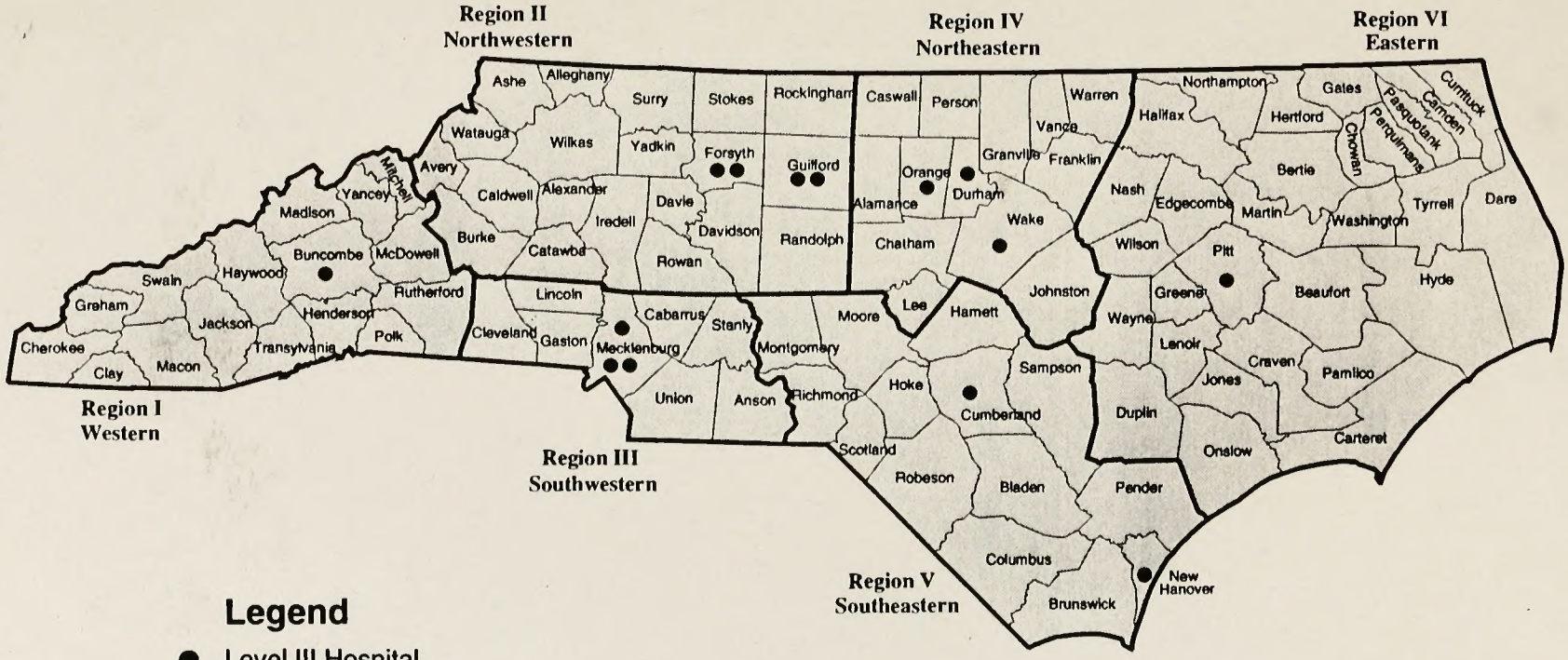
Region	1991 HD	1991 N-HD	1993 HD	1993 N-HD
STATEWIDE	233	177	253	183
Covered by CSCP	164	95	187	120
Percent	70.4	53.7[c]	73.9	65.6[a]
WESTERN	9	3	15	8
Covered by CSCP	4	2	10	5
Percent	44.4	66.7	66.7	62.5
NORTHWESTERN	42	46	41	49
Covered by CSCP	31	28	24	34
Percent	73.8	60.9	58.5	69.4
SOUTHWESTERN	54	23	54	28
Covered by CSCP	35	10	38	16
Percent	64.8	43.5[a]	70.4	57.1
NORTHEASTERN	25	36	29	33
Covered by CSCP	18	15	22	22
Percent	72.0	41.7[b]	75.9	66.7
SOUTHEASTERN	39	32	48	26
Covered by CSCP	29	17	35	13
Percent	74.4	53.1[a]	72.9	50.0[a]
EASTERN	64	37	66	39
Covered by CSCP	47	23	58	30
Percent	73.4	62.2	87.9	76.9

*includes infant deaths

[a] $p < 0.05$
[b] $p < 0.01$
[c] $p < 0.001$

North Carolina Perinatal Care Regions

Counties with Level Three Hospitals



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